EXHIBIT

9

DEFENDANTS' MOTION TO EXCLUDE THE TESTIMONY OF DR. CHRISTOPHER TEAF

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Food-Related Illness and Death in the United States

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To better quantify the impact of foodborne diseases on health in the United States, we compiled and analyzed information from multiple surveillance systems and other sources. We estimate that foodborne diseases cause approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States each year. Known pathogens account for an estimated 14 million illnesses, 60,000 hospitalizations, and 1,800 deaths. Three pathogens, *Salmonella, Listeria*, and *Toxoplasma*, are responsible for 1,500 deaths each year, more than 75% of those caused by known pathogens, while unknown agents account for the remaining 62 million illnesses, 265,000 hospitalizations, and 3,200 deaths. Overall, foodborne diseases appear to cause more illnesses but fewer deaths than previously estimated.

More than 200 known diseases are transmitted through food (1). The causes of foodborne illness include viruses, bacteria, parasites, toxins, metals, and prions, and the symptoms of foodborne illness range from mild gastroenteritis to life-threatening neurologic, hepatic, and renal syndromes. In the United States, foodborne diseases have been estimated to cause 6 million to 81 million illnesses and up to 9,000 deaths each year (2-5). However, ongoing changes in the food supply, the identification of new foodborne diseases, and the availability of new surveillance data have made these figures obsolete. New, more accurate estimates are needed to guide prevention efforts and assess the effectiveness of food safety regulations.

Surveillance of foodborne illness is complicated by several factors. The first is underreporting. Although foodborne illnesses can be severe or even fatal, milder cases are often not detected through routine surveillance. Second, many pathogens transmitted through food are also spread through water or from person to person, thus obscuring the role of foodborne transmission. Finally, some proportion of foodborne illness is caused by pathogens or agents that have not yet been identified and thus cannot be diagnosed. The importance of this final factor cannot be overstated. Many of the pathogens of greatest concern today (e.g., *Campylobacter jejuni*, *Escherichia coli* O157:H7, *Listeria monocytogenes, Cyclospora cayetanensis*) were not recognized as causes of foodborne illness just 20 years ago.

In this article, we report new estimates of illnesses, hospitalizations, and deaths due to foodborne diseases in the United States. To ensure their validity, these estimates have been derived by using data from multiple sources, including the newly established Foodborne Diseases Active Surveillance Network (FoodNet). The figures presented include estimates for specific known pathogens, as well as overall estimates for all causes of foodborne illness, known, unknown, infectious, and noninfectious.

Data Sources

Data sources for this analysis include the Foodborne Diseases Active Surveillance Network (FoodNet) (6), the National Notifiable Disease Surveillance System (7), the Public Health Laboratory Information System (8), the Gulf Coast States Vibrio Surveillance System (9), the Foodborne Disease Outbreak Surveillance System (10), the National Ambulatory Medical Care Survey (11), the National Hospital Ambulatory Medical Care Survey (12-14), the

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Table 2. Reported and estimated[a] illnesses, frequency of foodborne transmission, and hospitalization and case-fatality rates for known foodborne pathogens, United States

Disease or Agent	Estimated total cases	Reported Cases by Surveillance Type			% Foodborne transmission	Hospitalization rate	Case-fatality rate
		Active	Passive	Outbreak			
Bacterial							
Bacillus cereus	*27,360*		*720*	72	*100*	0.006	0.0000
Botulism, foodborne	*58*		29		*100*	0.800	0.0769
Brucella spp.	*1,554*		111		*50*	0.550	0.0500
Campylobacter spp	*2,453,926*	*64,577*	37,496	146	*80*	0.102	0.0010
Clostridium perfringens	*248,520*		*6,540*	654	*100*	0.003	0.0005
Escherichia coli O157:H7	*73,480*	*3,674*	2,725	500	*85*	0.295	0.0083
E. coli, non-O157 STEC	*36,740*	*1,837*			*85*	0.295	0.0083
E. coli, enterotoxigenic	*79,420*		*2,090*	209	*70*	0.005	0.0001
E. coli, other diarrheogenic	*79,420*		*2,090*		30	0.005	0.0001
Listeria monocytogenes	*2,518*	*1,259*	373		*99*	0.922	0.2000
Salmonella Typhi[b]	*824*		412		*80*	0.750	0.0040
Salmonella, nontyphoidal	*1,412,498*	*37,171*	37,842	3,640	*95*	0.221	0.0078
Shigella spp.	*448,240*	*22,412*	17,324	1,476	*20*	0.139	0.0016
Staphylococcus food poisoning	*185,060*		*4,870*	487	*100*	0.180	0.0002
Streptococcus, foodborne	*50,920*		*1,340*	134	*100*	0.133	0.0000
Vibrio cholerae, toxigenic	*54*		27		*90*	0.340	0.0060
V. vulnificus	*94*		47		*50*	0.910	0.3900
Vibrio, other	*7,880*	*393*	112		*65*	0.126	0.0250
Yersinia enterocolitica	*96,368*	*2,536*			*90*	0.242	0.0005
Subtotal	*5,204,934*						
Parasitic							
Cryptosporidium parvum	300,000	*6,630*	2,788		*10*	0.150	0.005
Cyclospora cayetanensis	*16,264*	*428*	98		*90*	0.020	0.0005
Giardia lamblia	*2,000,000*	*107,000*	22,907		*10*	n/a	n/a
Toxoplasma gondii	*225,000*		15,000		*50*	n/a	n/a
Trichinella spiralis	*52*		26		100	0.081	0.003
Subtotal	*2,541,316*						
Viral							
Norwalk-like viruses	*23,000,000*				*40*	n/a	n/a
Rotavirus	*3,900,000*				*1*	n/a	n/a
Astrovirus	*3,900,000*				*1*	n/a	n/a
Hepatitis A	*83,391*		27,797		*5*	0.130	0.0030
Subtotal	*30,883,391*						
Grand Total	***38,629,641***						

[a]Numbers in italics are estimates; others are measured.
[b]>70% of cases acquired abroad.

million illnesses each year, including 5.2 million (13%) due to bacteria, 2.5 million (7%) due to parasites, and 30.9 million (80%) due to viruses (Table 2). Overall, foodborne transmission accounts for 13.8 million of the 38.6 million illnesses (Table 3). Excluding illness caused by *Listeria*, *Toxoplasma*, and hepatitis A virus (three pathogens that typically cause nongastrointestinal illness), 38.3 million cases of acute gastroenteritis are caused by known pathogens, and 13.6 million (36%) of these are attributable to foodborne transmission. Among all illnesses attributable to foodborne transmission, 30% are caused by bacteria, 3% by parasites, and 67% by viruses.

Hospitalizations

To estimate the number of hospitalizations due to foodborne transmission, we calculated for each pathogen the expected number of hospitalizations among reported cases by